TRIO
MOTION TECHNOLOGY
A MEMBER OF THE **ESTUN** GROUP

TRIO MOTION TECHNOLOGY
Motion-PLC
MCS 30 - MC 34|35

EtherCAT.

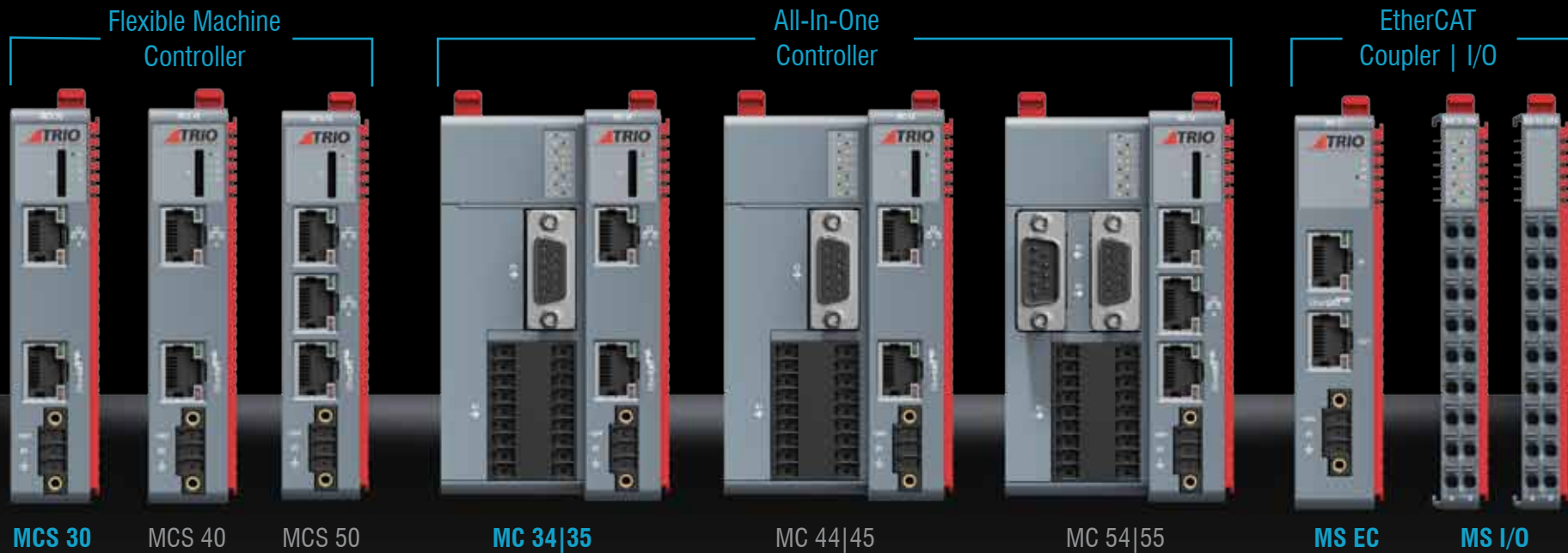- THE MOTION SPECIALIST -

Introducing *Motion*-PLC

New class of controller…
Motion…Logic…

Motion-PLC Range

Flexible Machine Controller			All-In-One Controller			EtherCAT Coupler	I/O	
MCS 30	MCS 40	MCS 50	MC 34|35	MC 44|45	MC 54|55	MS EC	MS I/O

Introducing *Motion*-PLC

Motion-First Automation

Trio's *Motion*-PLC incorporates advanced motion functions alongside the simplicity of a PLC; a true paradigm shift in the world of motion and factory automation.

The *Motion*-PLC range comprises a family of controllers designed to integrate Trio's advanced motion control features with the simplicity of a PLC in a compact an economical package.

Combining the *Motion*-iX core with PLC programming languages and a PLCopen motion library gives machine designers complete flexibility in the machine design, with confidence that Trio's **Motion-First** Automation principle will ensure maximum machine performance.

Expansion connectivity for factory automation is provided through fieldbuses including **PROFINET** and **Ethernet/IP**. For machine control requiring more real-time and deterministic behaviour either EtherCAT or Trio's MS I/O System are perfectly suited.

The *Motion* **Perfect** integrated development environment provides programming, diagnostics and debug for all Trio products including the *Motion*-PLC range. *Motion* **Perfect** enables design, development, testing and deployment in a single tool.

In typical machine design the PLC offers the familiar programming languages of IEC 61131-3 and allows easy integration to machine I/O and machine sensors for general machine control. The motion controller is generally viewed as a more complex part of the machine, controlling multiple axes and typically   programmed in a high level language.
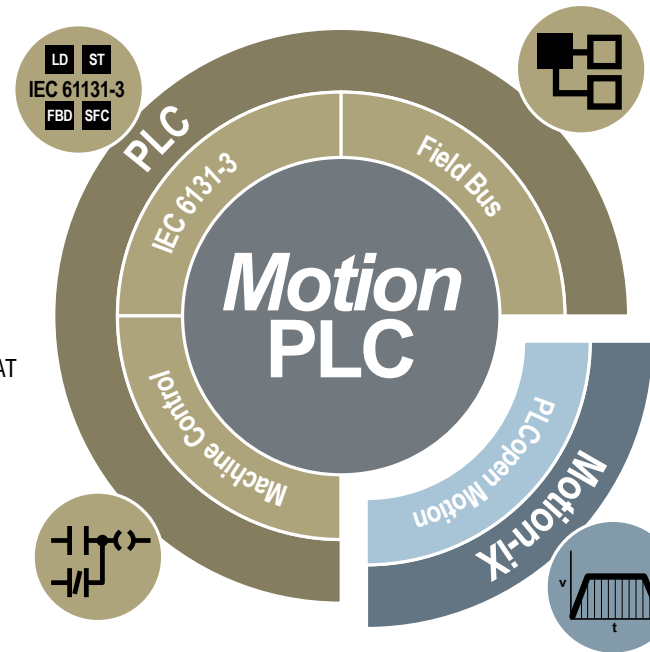
Trio's *Motion*-PLC offers the familiar **IEC 61131-3** PLC languages including **LD, ST, FBD** etc., alongside a simplified PLCopen motion library for motion control. With a multi-tasking operating system allowing execution of multiple IEC tasks the Motion-PLC provides motion control and logic control in a single device.

Execution of the complete machine program in a single device allows:

- Improved data sharing between applications
- Removing latency of any fieldbus connections
- Removing cabling and improving reliability
- Saving cost and time in machine development

Which results in faster more reliable machines.

Trio's latest range of controllers builds on a successful motion heritage, integrating PLC functionality to offer Trio's *Motion*-iX core alongside PLC programming languages in a single *Motion*-PLC.

Motion PLC — LD ST IEC 61131-3 FBD SFC — PLC — IEC 61131-3 — Field Bus — Machine Control — PLCopen Motion — *Motion*-iX

Trio's *Motion*-PLC range includes:

PLC programming languages (IEC 61131-3)

PLCopen motion library

Motion-iX core for advanced motion and machine control

Synchronized I/O expansion though Trio's MS-Bus I/O System

EtherCAT for real-time remote devices (e.g. Drives and I/O)

Fieldbus support (PROFINET and Ethernet/IP for upstream connections)

Motion-PLC
Overview

MCS 30
Flexible Machine Controller

AT A GLANCE

- New class of controller for machine solutions combining mathematical processing power and logic control in a compact design

- **'30' range**: EtherCAT Axes (0 to 4)

- All controllers compatible with **MS I/O System**

Local I/O expansion is provided though a MS-Bus interface and the MS I/O system, supporting up to 16 slices. Slices can be any combination of digital inputs, digital outputs, analogue inputs or analogue outputs.

Both the MS-Bus and EtherCAT are synchronized to the *Motion*-iX core, allowing deterministic behaviour of all devices for use with motion and machine applications.

The Ethernet port supports application programming along with HMI and PLC protocols including Modbus TCP, PROFINET IO and Ethernet/IP.

Programmed in the industry standard IEC61131-3 (including PLCopen).

MCS controllers are ideally suited to control simpler stand-alone machines.

The MCS 30 is a 'Flexible Machine Controller' ideal for simple machines. It provides a user with a PLC programming background access to the IEC 61131-3 languages "out of the box".

With local I/O expansion through the MS-Bus and Trio's MS I/O system, remote expansion through EtherCAT and Ethernet communications for both programming and factory communications MCS controllers provide a flexible solution for simple machines.

- **Entry level controller**

- **Axes upgradable up to 4**

- **Add I/O with MS I/O System**

- **Competitive controller and I/O solution**

- **IEC61131-3 and Unified API**

MCS 30

SUB-MACHINES
Ideal for: Gantry Machines

MCS 30 (P620)
1 Ethernet Port
1 EtherCAT Port
MS I/O Interface

Upgrade FEC Codes	
P982	Add One Axis (max:4)
P981	Increase I/O up to 1024 Digital - 128 Analogue
P751	Security

MC 34 - MC 35
All-In-One Machine Controller
Motion Coordinator + high performance I/O

MC controllers are ideal for more advanced machines requring higher performance features. E.g. Registration inputs and a 'Flexible Axis Port' for reference encoder input / pulse output.

The MC 34 (NPN) and MC 35 (PNP) are 'All-In-One' Controllers ideal for general machines.

A single serial port allows Modbus RTU communications.   Local I/O expansion is through the MS-Bus interface and Trio's MS I/O system, remote expansion through EtherCAT and Ethernet for communications, MC controllers provide an 'all-in-one' solution for advanced machines.

- On-board I/O
- Serial Port (RS232 / RS485)

MC 34 - MC 35

SMALL STAND-ALONE MACHINES
Ideal for: Glue Laying, Flying Shear

MC 34 (P629) (NPN)
MC 35 (P634) (PNP)
1 Ethernet Port
1 EtherCAT Port
1 Serial Port
NPN or PNP On-board I/O
MS I/O Interface

Upgrade Codes	
P982	Add One Axis (Max 4 Axes)
P981	Increase I/O up to 1024 Digital - 128 Analogue
P751	Security

All Controllers
Specification

		MCS 30 **P619**	MC 34 **P629**	MC 35 **P634**
Axes	EtherCAT axes	0 - (up to 4 with FEC)		
Upgrades	Feature Enable Code (FEC)	P981 (Increase I/O up to 1024 Digital - 128 Analogue) P982 (add 1 axis - up to 4) P751 (Security)		
Peripherals	Digital Input	0	8 NPN	8 PNP
	Digital Input or Output	0	8 NPN	8 PNP
	Flexible Axis Port	0	0	0
	Registration Input	0	4	4
	Display	LED Status	LED Status + I/O Indicators	LED Status + I/O Indicators
	MS I/O Interface	Yes		
	SD Card	Yes		
MS I/O	Max # of I/O slices directly coupled	16		
Programming	Languages	IEC61131-3 (LD, ST, FBD, SFC)		
	Motion Features	PLCopen (Simple)		
	Motion Cycle Time	1ms, 2ms, 4ms		
	Maximum Programs / Tasks	16/2		
	User Memory	8 Mb		
	Max VR variables	4096		
	Execution Benchmark (lines/ms)	70 (single core)		
	Flash Memory	32 x 1600 values		
	Table Memory	512000 values		

*User application runs in a dedicated core to ensure execution time is unaffected by motion and communication load

All Controllers
Specification

		MCS 30 **P619**	MC 34 **P629**	MC 35 **P634**
EtherCAT	EtherCAT nodes	32		
	EtherCAT PDO data	EtherCAT update rate ≥2ms 1514 bytes EtherCAT update rate 1ms 896 bytes		
	EtherCAT profiles	CoE, FoE		
Communications	Ethernet Port 100Mbit/s	1		
	EtheCAT Port 100Mbit/s	1		
	Serial Port RS232/RS485	0	1	
Protocols	Serial Port	n/a	Modbus RTU, Custom Protocol	
	Ethernet	*Motion* Perfect, Uniplay, Modbus TCP, PROFINET IO, Ethernet IP		
Dimensions	H x D x W (mm)	100 x 75 x 23	100 x 75 x 59	
Power Supply		24V		
Environmental	Operating Temperature	- 20 to + 55 deg C		
	IP rating	IP20		
Certifications		RoHS, CE		

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Preliminary specifications may change without notice

MS I/O System
Compact Expansion

Motion-PLC Connection

MS I/O System offers a compact, robust, high performance I/O expansion system. The 'MS-Bus' slice interface enables direct connection to the *Motion*-**PLC** range of *Motion Coordinators*. The MS EC EtherCAT coupler along with our MS I/O slices offer a distributed remote I/O solution keeping the I/O close to the sensor reducing cabling.

For the most compact machine control solution, connect MS I/O directly to our *Motion*-PLC range of controllers.

AT A GLANCE

- High performance, flexible topology and simple configuration

- Compact size, 12mm slice width

- Easy wiring through spring clamp connectors

- DIN rail mounted with forword slice insertion

- Up to 16 slices connected to a coupler for remote I/O

- EtherCAT coupler supporting update rates from 125us to 4ms

- I/O functions synchronized to EtherCAT cycle

- Competitive I/O solution

- RoHS, CE

- Connection via our MS-Bus Interface

- Local expansion up to 16 slices

- Any combination of slices

- Select MCS 30 – MCS 34 / MC 35 controllers for competitive 'Controller + I/O solution' up to 256 I/O

MS I/O system can be tailored to the I/O requirements of the machine with any combination of digital inputs, digital outputs, analogue inputs or analogue outputs.
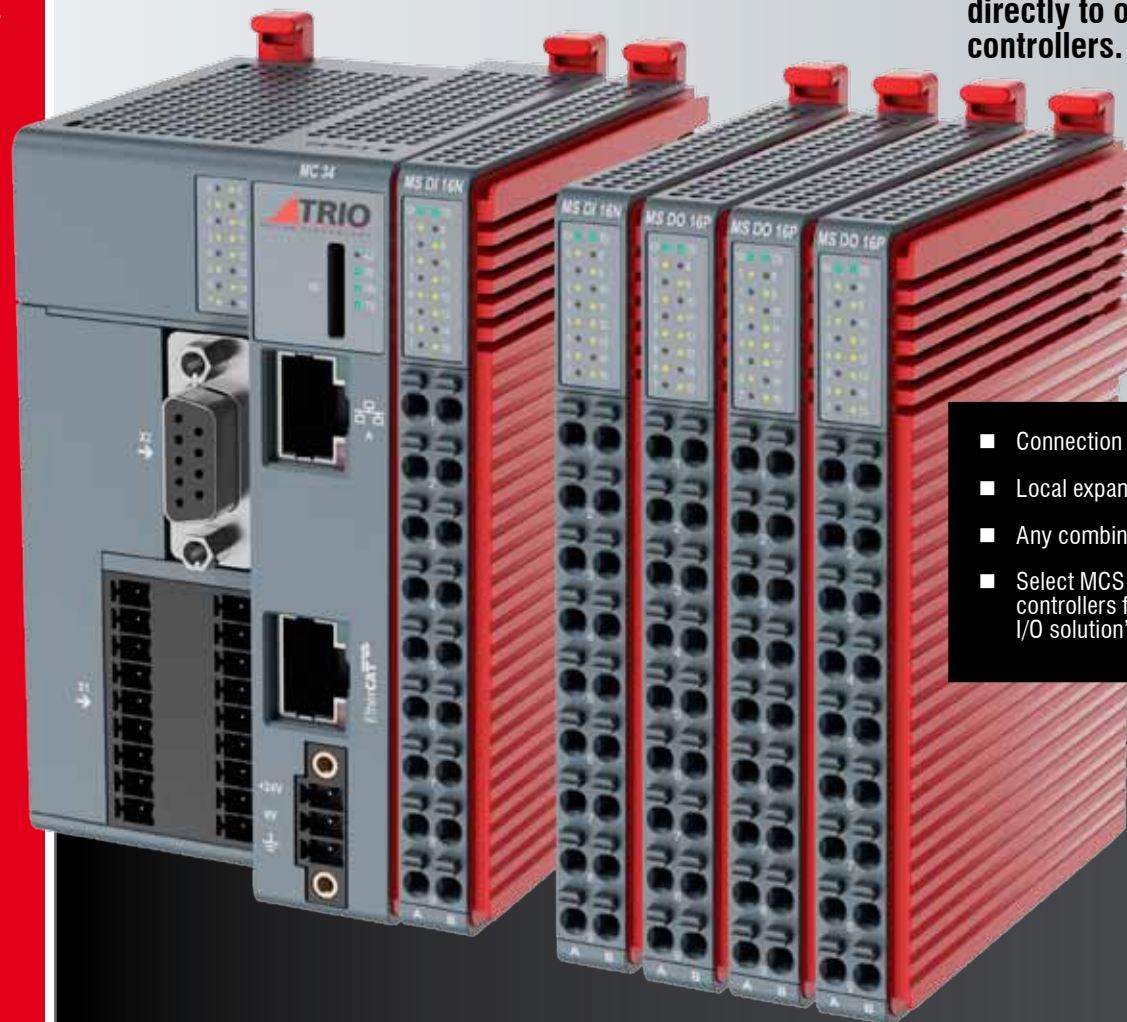
With front face insertion and removal, slices can be easily fitted or swapped.

Spring clamp connectors allow easy wire insertion and push button wire removal making wiring quick and easy.

Both the slice interface and EtherCAT are synchronized to the *Motion*-iX core, allowing deterministic behaviour of all devices for use with motion and machine applications.
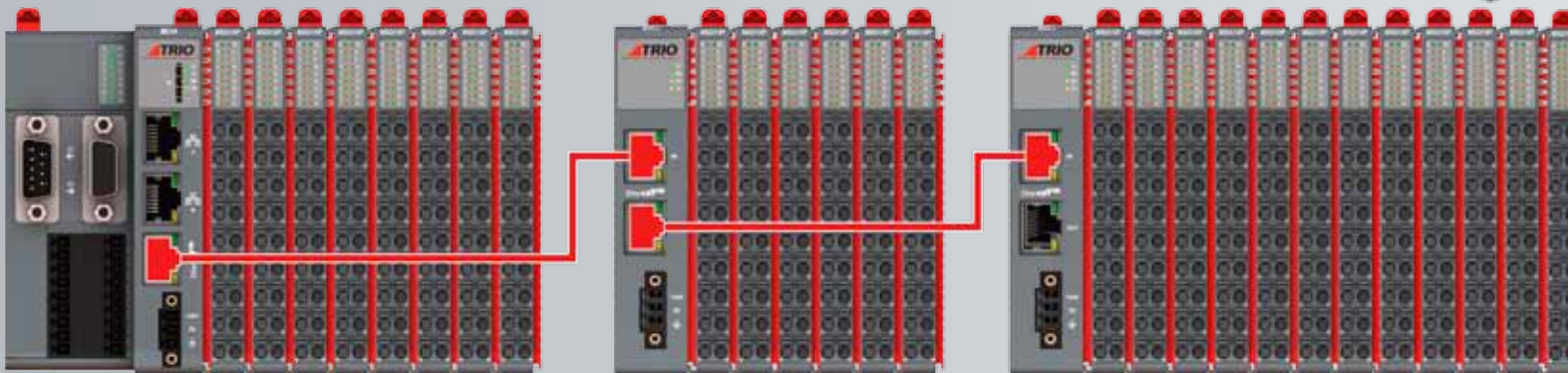
EtherCAT Coupler Connection

Providing the most flexibility to add MS I/O on a machine the P659 MS EC EtherCAT Coupler allows:

- Scalability via EtherCAT

- Motion optimised slices

- Distributed I/O stations to reduce cabling complexity

- Combine with ANY Trio EtherCAT controller for a highly compact, modular system

- Use with 3rd Party EtherCAT controllers

The MS EC EtherCAT Coupler supports update rates from 125us to 4ms, providing performance for both motion control and general automation applications.

With EtherCAT IN and OUT ports the MS EC Coupler can be placed at any point in the EtherCAT network.

Up to **16 MS I/O slices** can be connected via **MS-Bus** to a single **MS EC Coupler** in any combination. Multiple couplers can be connected to a single EtherCAT controller for complete machine control.

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MS I/O System
Compact Expansion

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P659: MS EC

The P659 MS EC EtherCAT coupler provides a gateway to the MS I/O System for any EtherCAT master. One coupler can connect up to 16 slices.

Power Supply	24V ± 10%
EtherCAT Connection	RJ45 x 2
Protocol	EtherCAT
Update Rates	125us, 250us, 500us, 1ms, 2ms, 4ms
Data Rate	100Mbit/s
Network Cable	CAT5e min
Dimensions WxHxD (mm)	23 x 100 x 75
Compliance	RoHS, CE

P001: MS DI 16N
P002: MS DI 16P

The digital input slice connects 24V DC signals on the machine to binary control registers.
The 16 inputs are either NPN current sourcing (P001) or PNP current sinking (P002) type and have electrical isolation. All connections are via 18 way push-in connectors.
The slice indicates the input signal states via LEDs.

Digital Input Channels	16
Power Supply	24V ± 10%
ON voltage	>15V
OFF voltage	<5V
Input Current	3.5mA
Input Filter Cut-Off	18kHz
Protection	Overvoltage Overcurrent Reverse Voltage
Dimensions WxHxD (mm)	12 x 100 x 75
Compliance	RoHS, CE

P003: MS DO 16N
P004: MS DO 16P

The digital output slice connects 24V DC signals on the machine to binary control registers.
The 16 outputs are either NPN current sourcing (P003) or PNP current sinking (P004) type and have electrical isolation. All connections are via 18 way push-in connectors.
The slice indicates the output signal states via LEDs.

Digital Output Channels	16
Power Supply	24V ± 10%
Load Type	Resistive, Indictive, Capacitive
ON time	100us
OFF time	100us
Max. Output Current	500mA (per channel), 4A (per slice)
Protection	Short Circuit, Overvoltage, Reverse Voltage
Dimensions WxHxD (mm)	12 x 100 x 75
Compliance	RoHS, CE

Preliminary specifications may change without notice

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P005: MS AI 4S

The P005 analogue input slice has 4 Voltage or current channels, each with a programmable range and digitized to a resolution of 16-bits. Each channel has a separate 0V and shield connection for optimized signal to noise ratio.
All connections are via 18 way push-in connectors

Analogue Input Channels	4
Power Supply	24V ±10%
Signal Voltage	±10V 0-10V ±-5V 0-5V
Signal Current	4-20mA 0-20mA ±20mA
Resolution	16-bit
Protection	Overvoltage
Dimensions WxHxD (mm)	12 x 100 x 75
Compliance	RoHS, CE

P006: MS AO 4SV

The P006 analogue output slice has 4 Voltage channels, each with a programmable voltage range and digitized to a resolution of 16-bits. Each channel has a separate 0V and shield connection for optimized signal to noise ratio.
All connections are via 18 way push-in connectors

Analogue Input Channels	4
Power Supply	24V ± 10%
Signal Voltage	+/-10V
Signal Current	±6mA
Resolution	16-bit
Protection	Short Circuit
Dimensions WxHxD (mm)	12 x 100 x 75
Compliance	RoHS, CE

P007: MS AO 4SC

The P007 analogue output slice has 4 current channels supporting a 4 to 20mA output range and digitized to a resolution of 16-bits. Each channel has a separate 0V and shield connection for optimized signal to noise ratio.
All connections are via 18 way push-in connectors.

Analogue Input Channels	4
Power Supply	24V ± 10%
Signal Current	0-20mA
Resolution	16-bit
Protection	Short Circuit
Dimensions WxHxD (mm)	12 x 100 x 75
Compliance	RoHS, CE

Preliminary specifications may change without notice

Motion-PLC
Building Your Solution

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UNIPLAY HMI

System is a revolutionary way to make operator interfaces better, easier and more secure.

MOTION PERFECT

A fully featured IDE for program development and debugging in all Motion-iX languages including TrioBASIC, IEC61131-3, multi-page HMI screen development and diagnostic tools for machine commissioning.
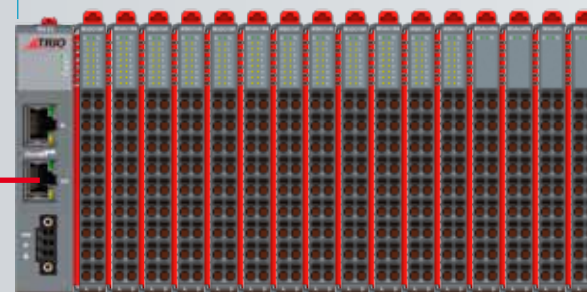
MCS 30
Flexible Machine Controller

MC 34 / MC 35
All-In-One Controller

MS EC

Provides a gateway to the MS I/O System for any EtherCAT master

MS-Bus

COMPACT I/O

Up to 16 slices can be connected to a single coupler and multiple couplers can be connected to a single controller for complete machine control. Up to 16 slices can also be directly coupled to the Motion-PLC controllers via MS-Bus.

MS I/O

Offers a compact, robust, high performance I/O expansion system.

EtherCAT

DX DRIVES
MX MOTORS

Solutions with new DX servo drive and MX motor range provide performance and dependability, delivering everything you need and nothing more.

Motion-PLC
Building Your Solution

Build Your Solution for Your Machine with Trio's fully integrated range of operator interfaces, *Motion Coordinators*, I/O options, matched servo drives & motors.

Trio's unique **UNIPLAY** HMI is a revolutionary way to make operator interfaces better easier and more secure!

Compact modular **Motion-PLC** controllers and the **MS I/O System** allow for the selection of only the hardware and optional features required; saving cost and reducing the panel space.

DX servo drives and MX servo motors; provide performance and dependability delivering; **'Everything you need…nothing more'**.

UNIPLAY HMI

UNIPLAY touch panels 7", 10" and 15".
Integrated HMI programming as part of machine solution.
Centralised program / HMI screen storage in a single project.
Tightly integrated to *Motion*-PLC application.
Link HMI buttons to functions in *Motion*-PLC program.
Simulator built into *Motion* Perfect to test designs before deployment.
Connect up to 2 HMI's to your *Motion*-PLC.
Ethernet connection reduces wiring.

DX - Servo Drives

Fully integrated into *Motion* Perfect.
Matched with MX motor range.
Zero stacking.

DX5	Systems Level Drive	200V ac (3-phase) supply module
		Dual 750W axis module, supports 750W & 400W motors
		Dual 400W axis module, supports 400W, 200W & 100W motors
DX4	Performance Level Drive	200V ac from 50W up to 3kW including additional encoder port
DX3	Entry Level Drive	200V ac from 50W to 2kW
		480V ac from 1kW to 7.5kW

DX4 and DX3 EtherCAT drives have safe torque off (STO) inputs; inputs are safety rated SIL3 level according to IEC 61508, IEC 62061 standards. STO inputs are used in conjunction with your external E-stop circuits to disable the drive's output power stage to the motor.

MX - Servo Motors

MXL	50W - 5kW Low Inertia - High Speed - up to 6000rpm
MXJ	200W - 1kW Intermediate Inertia - High Speed - up to 6000rpm
MXM	850W - 7.5kW Medium Inertia - Medium Speed - up to 3000rpm

IEC 61131-3 and PLCopen

IEC61131-3

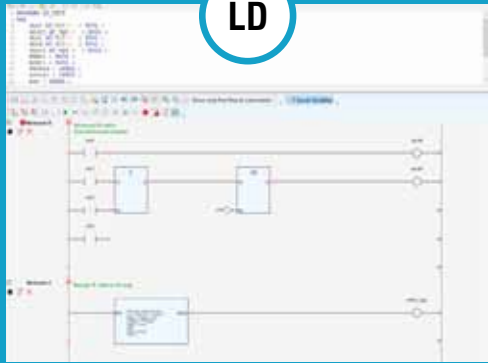Standardised, unified suite of programming languages for industrial automation.

PLCopen

Providing standard application libraries for simple machines. Compatible with all IEC 61131-3 languages (ST, LD, FBD, SFC)

IEC 61131-3

LADDER DIAGRAM
Graphical Programming Language

LD

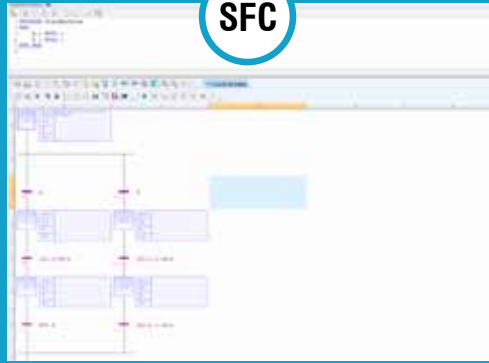### STRUCTURED TEXT
Textual Programming Language

ST

FUNCTION BLOCK DIAGRAM
Graphical Programming Language

FBD

SEQUENTIAL FUNCTION CHART
Graphical Programming Language

SFC

Simplified PLCopen Function Block Library for Motion Control

Function Type	Single Axis
Motion	MC_Home
	MC_Stop
	MC_Halt
	MC_MoveAbsolute
	MC_MoveRelative
	MC_MoveVelocity
Administrative	MC_Power
	MC_ReadStatus
	MC_ReadAxisError
	MC_ReadParameter
	MC_ReadBool Parameter
	MC_WriteParameter
	MC_WriteBoolParameter
	MC_ReadDigitalInput
	MC_ReadDigitalOutput
	MC_WriteDigitalOutput
	MC_ReadActualPosition
	MC_ReadActualVelocity
	MC_TouchProbe
	MC_DigitalCamSwitch
	MC_Reset

- THE MOTION SPECIALIST -

Motion Perfect

Design, Develop, Test, Deploy and Secure

Built on Trio's *Motion*-iX core technology, **Motion Perfect** provides the user with an easy to understand interface for rapid application development, controller and drive configuration and monitoring of functions.

The commissioning of DX Servo Drives and machines is made simple with a series of Device Configuration Screens allowing access to status information and diagnostics at a glance. All motor axes can be detected, setup, monitored and controlled in real-time from the easy to use dialogue windows.

Motion Perfect includes access to IEC 61131 and PLCopen. Advanced visualisation including a 3D oscilloscope and IP protection of your projects are also included within *Motion* Prefect.

Motion Perfect is **FREE** to download and use.

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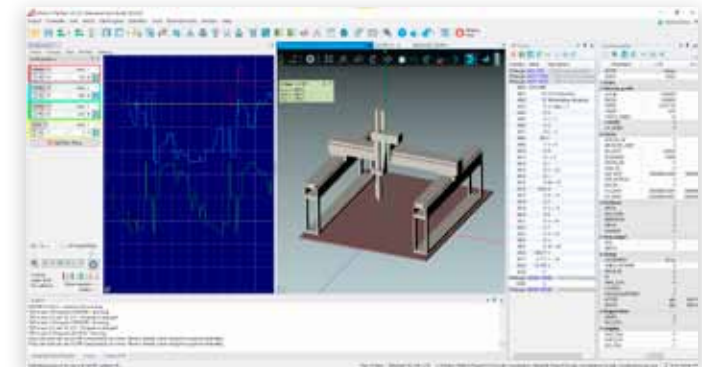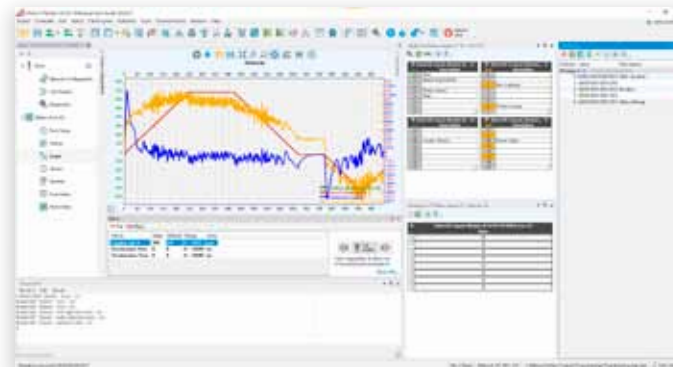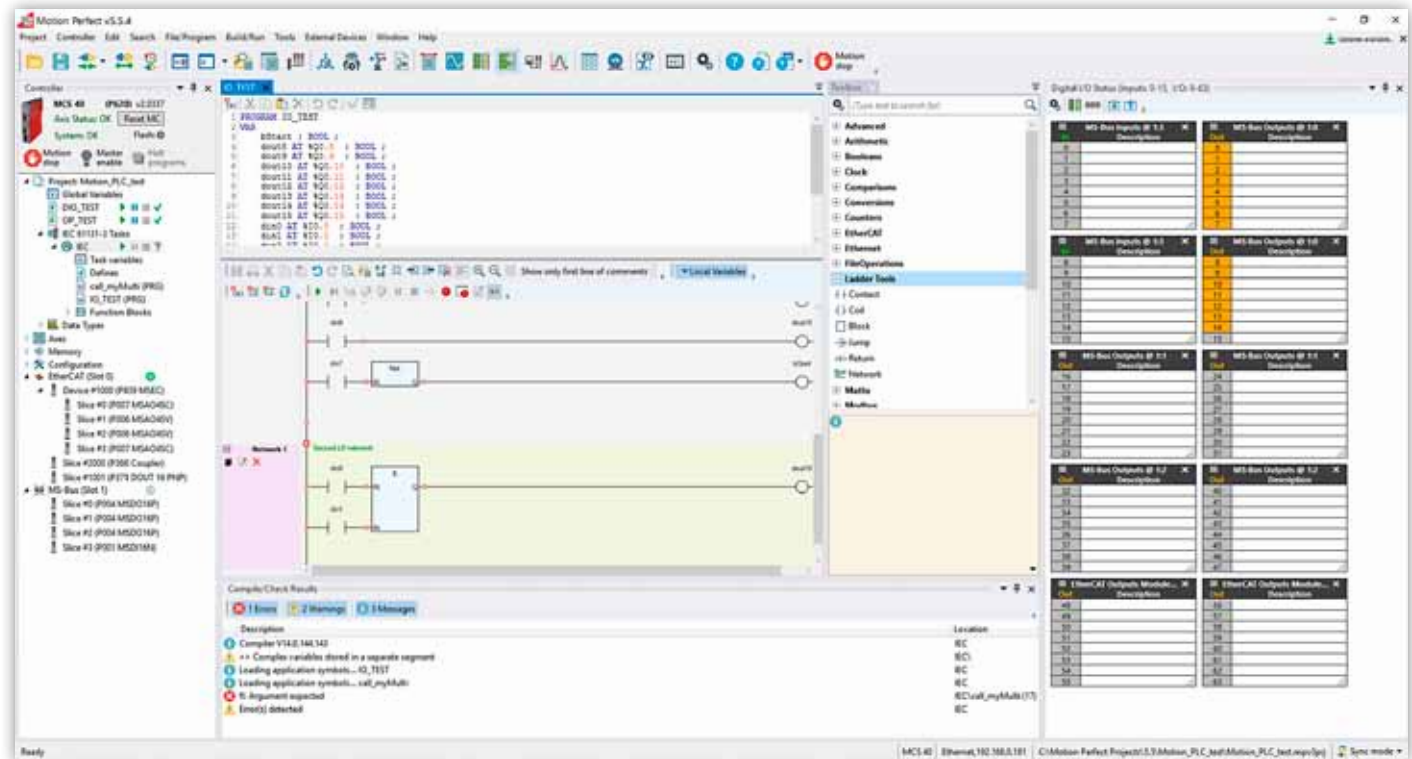
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TRIO MOTION TECHNOLOGY
Motion-PLC

Trio Motion Technology specialises in advanced motion control as a core, providing a range of *Motion Coordinators*, drives and motors, expansion interfaces, I/O modules and HMI's built on *Motion*-iX technologies and designed to enable the control of industrial machines with the minimum of external components.

In support of the Trio concept, we aim to offer the best technical support by telephone, email, our comprehensive website and training courses held throughout the year. Please look at our web site for details.

www.triomotion.com

TRIO MOTION TECHNOLOGY
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R&D CENTRES
3x Control and Software Technology
2x Servo Drive and Motors

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FRANCE
GERMANY
HUNGARY
ITALY
NETHERLANDS
NORWAY
POLAND
PORTUGAL
ROMANIA
SLOVAKIA
SLOVENIA
SPAIN
TURKEY

NORTH AMERICA
ALABAMA
ARIZONA
CALIFORNIA
ONTARIO
QUEBEC
COLORADO
CONNECTICUT
FLORIDA
GEORGIA
ILLINOIS
INDIANA
IOWA
MASSACHUSETTS
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CHINA
MALAYSIA
NANJING
PHILLIPINES
SINGAPORE
SOUTH KOREA
TIAWAN
VIETNAM

ASIA
INDIA
SINGAPORE
THAILAND
UAE
SRI LANKA
BANGLADESH
SS AFRICA

OCEANIA
AUSTRALIA
NEW ZEALAND

5 R&D Centres

18 Integrators

32 Countries of Sale

103 Sales Partners Globally